

REMARKS

Applicant has amended claims 1, 5, 8 and 9 to overcome the formal objections raised by the Examiner in paragraph 1 of the Office Action, page 2. If there are any other formal matters to which the Examiner has an objection, applicant would be happy to address such matters.

Turning now to the rejection under 35 U.S.C. § 103(a), the Examiner has rejected claims 1-4 and 6-8 as being unpatentable over the combination of *Chen, et al.* in view of *Below, et al.* and *Ellis, et al.*

Before applicant points out the language in claim 1 which is believed to patentably distinguish over the combination of references cited by the Examiner, applicant would like to review the problems associated with using RJ-45 connectors in an industrial environment prior to applicant's invention. There were four problems facing the introduction of RJ-45 connectors into manufacturing environments, such as are found in the automation manufacturing industry.

First, the prior art is as represented in the *Chen* patent, wherein the Ethernet switching hub included a metallic casing suitable for mounting in a rack or to a panel. Each of the RJ-45 connectors is connected to a panel wall, flush with the exterior, and the mating Ethernet connector is simply attached to the mounted connector as is conventionally known. The manufacturing environment, on the other hand, calls for the inclusion of an Ethernet switching hub which may, for example, have to reside on the floor and stand on its own, without a metal casing, as *Chen* appears to show. Obviously, the rack-mounted module shown in *Chen* is suitable only for rack or panel

use. One reason for its unsuitability in an industrial environment is that there is frequent handling of the hub which would tend to loosen the connection or interrupt the connection at the connector. This problem is overcome in the instant invention by using a quick disconnect connector -- that is, one having an internally threaded member on the mating connector and an externally threaded member on the mounted connector.

Second, the Ethernet connector of the type shown in *Chen*, because it is mounted within a metallic housing, are subject to damage because they are exposed, not "hardened". That is, such connectors as shown in *Chen* are simply mounted flush with the panel wall, leaving the face of the RJ-45 connectors subject to damage in an industrial environment. Moreover, the contact interface between mating connectors in *Chen* is exposed to mechanical shock and to vibration. It will be appreciated that the connector may be located in or on a control cabinet for a machine.

The present invention solves these problems by providing a protective member (the "receptacle") and extending the receptacle to include a threaded portion 52 (FIG. 9) which receives a mating coupling nut of the mating connector, and an overmold which provides strain relief and vibration isolation. Thus, in use, the more fragile RJ-45 connector is protected by being totally enclosed in a rugged enclosure comprising the receptacle 43 and the coupling nut of the mating RJ-45 connector (not shown in the drawing). The receptacle and mating connector are threaded together to form a sealed, protective housing to secure the connector and the connections against vibration and shock.

Third, the industrial environment is such that water spray or dust may readily

invade the switch controller of an Ethernet hub. The present invention provides in a receptacle for the RJ-45 connector, an extended shoulder 44 having a first sealing ring 48 for sealing the connector receptacle to the underside of a wall of the casing to which the protective connector receptacles are mounted and which house the Ethernet switch controller. In addition, however, moisture or dust is prevented from entering the connection area itself because of the further recess provided at the base of the threaded portion 52, and the inclusion of a second sealing ring 50 for sealing, not with the casing, but with the mating connector.

A fourth problem associated with incorporating conventional Ethernet connectors into an industrial environment is the location and protection of the Ethernet switch controller. In the present invention, the switch controller is housed in the same casing to which the connectors are mounted. However, that casing is suitable for use in an industrial environment, either by mounting to a vertical surface or resting on any horizontal surface. In any case, the casing is very rugged and the RJ-45 connections are securely threaded to avoid disconnection and provide additional protection.

Turning now to claim 1, there is recited a switching hub for an Ethernet network comprising a casing, a plurality of industrial connector assemblies mounted to a wall of the casing, and extending through that wall, each connector assembly includes a "receptacle of rigid non-conducting material defining an opening and an externally threaded extension" which projects outwardly of the wall of the casing. Claim 1 also recites an RJ-45 connector received in said opening (of the receptacle, that is) and a first sealing ring interposed between the receptacle and the wall of the casing. The claim

further recites a quick disconnect connector including an outer threaded portion mounted to said wall, an insert of non-conducting material, and a plurality of connecting elements carried by said insert. The claim goes on to recite a switch controller housed within the casing and including a transceiver circuit coupled to the RJ-45 connectors.

The teaching of *Chen* has already been discussed above. It discloses no more than the mounting of unprotected (or "unhardened") RJ-45 connectors directly to a housing.

Turning now to the remaining references, the *Below, et al.* patent discloses a nylon seal 61 (FIG. 9) which is located between a shoulder nut 64 and a plug receptacle 40. It is respectfully submitted that the structure of *Below, et al.* not directed to protecting the RJ-45 connector. Nor is it suited in any way to mounting an RJ-45 connector to the wall of a protective casing. The Examiner has simply taken one teaching out of *Below, et al.*, namely that it includes a seal and, without any suggestion or teaching in either reference that the structure of *Below, et al.* is suitable for mounting to a panel of a casing, as *Chen* requires. This argument simply begs the question of whether the claimed structure would have been obvious to one of ordinary skill in the art in view of the teachings of these two references. Applicant, for the reasons indicated above, and particularly the novel solution to all four problems indicated above, submits that applicant's claimed solution is not suggested by the combination of these references. The secondary references cannot be simply "added" to the *Chen* structure, and to modify *Chen* with no reason or suggestion to do so other than applicants' disclosure would be improper in a Section 103 rejection, as here.

Turning now to the *Ellis, et al.* reference, again, there is no suggestion of how the

structure of *Ellis, et al.* can be mounted to a hardened casing to protect an RJ-45 connector (which is not a commercial or industrial connector), and yet solve the remaining problems which applicant has discussed above. *Ellis, et al.* simply discloses a conventional O ring, such as that designated 38 or 32 in Fig. 2 to engage the inner wall of an internally threaded coupling nut or mounting nut to seal a connector body. Nowhere is there any suggestion to use a hardened receptacle for an RJ-45 connector and yet address all of the problems of an industrial connector as discussed above, including sealing the connector protective receptacle to a housing, and sealing the receptacle to a mating connector.

For the above reasons, it is respectfully requested submitted that claim 1 defines patentable subject over the prior art references cited by the Examiner; and reconsideration and favorable action is respectfully requested.

Respectfully submitted,

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